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ABSTRACT

The complexity of problems facing university administrators is examined, along with the confusion existing as to the role of research management within universities. Based on literature reviews, and discussions with administrators and researchers at various institutions, it is found that as university faculty move further away from pure or basic research supported by government grants toward development or applied work for outside sponsors, so the need arises for greater control of their activities, from an academic, organizational, financial, and other points of view. Each of these aspects of control is discussed, and the use of a management accountant is recommended. (LBH)

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PROGRAMME ON INSTITUTIONAL MANAGEMENT
IN HIGHER EDUCATION

AN INVESTIGATION INTO THE COSTING AND MANAGEMENT OF UNIVERSITY RESEARCH GRANTS AND CONTRACTS

by

Richard M. Mawditt and Victor Line

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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Second General Conference of Member Institutions (Paris January 20-22,1975)

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Note by the Secretariat

At any given point in time, the research groups of OECD's Programme on Institutional Management in Higher Education are in varying stages of advancement, since each has its own predetermined starting date and duration. On the occasion of the programme's Second General Conference of Member Institutions, final reports on the findings of three research groups which completed their work during 1974 are being presented. In addition, however, the Conference provides an opportunity for representatives of all the Member institutions to become acquainted with investigations in progress by other research groups participating in the programme. Thus, invitations have been extended to five on-going groups to present progress reports at the Conference. The topics included are :

- Identification of indices of performance for teaching activities;
- Indentification of indices of performance for service activities;
- The use of cost-effectiveness and cost-benefit techniques in planning courses of study for new higher educational institutions;
- The costing and management of university grants and contracts; and
- Economic and pedagogical aspects for managing new communication technologies in higher education.

Of the above listed topics, the first three are the subject of full-scale investigations to be carried out over a two-year time span. By contrast, feasibility studies of a relatively limited scope have been carried out in the case of each of the last two topics and it is expected that these feasibility studies will lead to the formulation and implementation of full-scale projects in a second stage.

With few exceptions, institutions of higher education perform both teaching and research functions. The efficient organisation of both types of activities poses management problems and has been cited by a considerable number of Member institutions as warranting investigation under the programme. In the case of research, projects have proliferated in many institutions as a result of funding received from sources outside the institution for support of research into problems of special interest to these sources, which might be business corporations, government agencies or other public or private bodies, while research which is financed by the institution itself usually continues. Thus, questions arise about the financial, academic and organizational implications of sponsored research, the procedures used to cover costs, and methods for the control and distribution of overheads. Since these questions are of considerable concern for the management of higher educational institutions, it was felt that a closer study of these problems could prove useful.

At a meeting of Member institutions in the United Kingdom convened in London in November, 1972, several universities expressed an interest in exploring the possibility of establishing a research group to jointly study problems related to the management of university research. Subsequently, it was decided that, as a first step, a feasibility study should be carried out which would lead to recommendations for a full-scale project. This study, which was completed in June, 1974, is the subject of this report. The proposals contained therein are currently under discussion within the United Kingdom, and it is hoped that it will be possible to launch a research group devoted to studying these problems sometime during 1975.

The Centre for Educational Research and Innovation wishes to express its sincerest thanks to the authors of this report.

PREAMBLE

Before considering the reasoning and implications of this research, it is necessary to be aware of the traditional funding of Universities in the United Kingdom. In 1974 there are some forty-four Universities, a third of which have been established over the last fifteen years, and these have become known as the New Universities. Before the advent of these New Universities, the University Colleges and Universities depended financially, to a very large extent, on donations, benefactions, endowments and grants from individuals and industry, and only in a limited way, on Government or Exchequer funds. The method for procuring funds was to attract benefactors to support research which in a progressive fashion, if successful, led to the teaching of undergraduates and the development of medicine, the sciences and the arts. The great Civic Universities of the United Kingdom, for example Birmingham, Bristol, Leeds, Liverpool, Manchester and Sheffield, developed in this way, receiving their wealth from the benefactors of their cities who had made their fortunes from the expansion of industry and commerce in the late nineteenth and early twentieth centuries. Before this time higher education had been the privilege of the few who were fortunate enough to attend the Colleges of Oxford, Cambridge, London and Edinburgh, which have spanned the centuries as institutions of research and pillars of learning and whose estates were their fortunes and source of perpetual income.

In the last twenty years financing of Universities in the United Kingdom has changed dramatically. Inflation has eroded the value of Universities' private resources and the ever increasing demand for University education has become a social necessity, influencing Governments to provide for both capital needs and recurrent financial support. This increasing demand for learning has only marginally accelerated the furtherance of research and Government's financial support for teaching is not backed in similar proportions for research needs. It has therefore become imperative that research, both pure and applied, is sponsored by grants and contracts not only from Exchequer funds but also from other sources.

It is the investigation into the Financing and Management of research grants and contracts that I am endeavouring to determine at the University of Bath. The paper which follows is presented as a feasibility study conducted at Bath in the early part of 1974, with a view to progressing to a substantive study commencing in the winter of 1974/75. At the time of writing a few conclusions can be made but I hope at the January conference to be able to add to what is written here, if only to express my personal views.

INTRODUCTION

At a meeting[1] between the staff of Universities, Polytechnics, University Grants Committee, Department of Education and Science, and the Head of Programme on Institutional Management in Higher Education (IMHE) of the Centre for Educational Research and Innovation (CERI) in the O.E.C.D., it was agreed that support should be given to the research proposals submitted by Mr. R. M. Mawditt, Director of Management Services at the University of Bath. These proposals were put forward under the theme 'Research Financing' as part of Phase II of the CERI programme.

During the course of discussions that took place in 1973 with the DES, who were to provide partial financial support for the project, it became clear that before undertaking a 2/3 year substantive study it would be advisable to carry out a feasibility study of the proposals submitted.

Accordingly, during the early part of 1974, Mr. V. E. Line of the School of Management, University of Bath, was seconded to the Management Services Unit to work under the direction of Mr. R. M. Mawditt, with the object of submitting a report in June to enable consideration to be given to the practicability and desirability of implementing these proposals with effect from October, 1974.

At the same time the Committee of Vice-Chancellors and Principals was discussing the question of charges made by Universities to outside bodies for work done on their behalf, with special reference to the recovery of overhead costs. This interest arose from the UGC letter of guidance sent to Universities in February, 1970 and the questions raised by the House of Commons Committee of Public Accounts, on the subject. One of the objectives of the feasibility study was to incorporate the research needs of the CVCP within the proposed substantive study to be undertaken by the University of Bath and its associates.

[1] Held in London in November, 1972, under the Chairmanship of Sir Kenneth Berrill, Chairman of the UGC.

Originating Proposals and Terms of Reference

The needs from such an investigation are not necessarily identical from one university to another but their inter-relationship and ultimate findings will be of considerable value not only to the universities involved but also to all members of the CERI group and other institutions of higher education. Tabulated below are the aspects which the Universities of Bath, Edinburgh and Essex have contrived to form a base for the investigation. It is expected that CERI will advise and co-operate with these universities on these issues, especially from experience gained from other institutions both in this country and abroad. The investigation will have the following terms of reference:

1. To review the financial, academic and organisational implications of sponsored research in universities.
2. To review the procedures used to recover all costs of research activities from sponsors other than the Exchequer.
3. To review the methods by which overhead expenditure and revenue are controlled and distributed.
4. To evaluate the direct and indirect costs of projects financed by research grants and contracts.
5. To review the management and organisation of research activities considering especially research groups and units and to consider the merit of inter-university or regional co-operation.
6. To consider the degree of control that should be imposed on research activities both academically and economically and whether any change should be contemplated in the next five or ten years.
7. To consider the manpower implications of research and development, including tenure of appointments, secondment of staff, take-over situations, career grading and training.
8. To consider the applied aspects of research and development with reference to industrial and management consultancy.

The first item above conforms to the abstract of the proposed research and covers the other terms of reference. Emphasis will be placed on the value of establishing true or real costs, especially for contracts. It has hitherto been an accepted issue in university government that measurement of academic research presents such difficulty as to invalidate any results. However, it is not the view of those involved with these proposals that measurement of externally sponsored research contracts should present too much difficulty and it is intended that true costs should be determined for this element. Equally important are the manpower implications and human aspects (Item 7) for which advice from personnel officers and possibly trade union officers will be sought.

There is every intention of using evidence of previous work undertaken in this field, e.g. University Grants Committee (Walne); Sussex (Fielden and Lockwood); and Bradford (Bottomley), and to use the services of chief officers in other universities and research institutions. Besides the universities directly involved, the universities associated with CERI have expressed a desire to be directly concerned with the investigation, especially Salford who wish to play a close supporting role. The need also for a large English university with a medical school to be associated is desirable and either Bristol or Southampton are likely possibilities.

FEASIBILITY STUDY

Terms of Reference

During the preliminary stages a meeting was held at the Department of Education and Science, Financing Branch, London, between Mr. B. E. Rodmell and Mr. N. B. W. Thompson of the DES, and Mr. R. M. Mawditt and Mr. V. E. Line of the University of Bath, to discuss the scope and nature of the feasibility study.

The original proposals, which included the costing and management of sponsored research, were agreed to be wide ranging. The aim of the feasibility study was to consider the practibility of these proposals and to put forward a research plan based on its findings.

This called for:-

1. A review of published literature relevant to the research topic.
2. A search for current or recently completed research that related to the topic.
3. Discussions with research practitioncrs familiar with the subject area.
4. Discussions with administrative staff in other universities/institutions to clarify the nature and purpose of the research project.

It would also enable assessment to be made of the potential cooperation from other institutions, the development of methodology, task allocation, work schedules, and the reporting arrangements of the substantive study.

Intra-University Cooperation

From the discussions held it appeared that cooperation would be forthcoming from administrators at a sufficient number and range of universities to enable a research plan to be developed that would meet the objectives of the project. The preferred method of approach to the study seemed to be for a Research Fellow to visit and spend time at each of the institutions to be included in the project, in order to obtain the necessary information direct from the participants. The nature of the study seemed to preclude the commitment of administrators to the role of research assistants working independently, or to an assessment of the resources needed at each university to comply with a research plan not yet developed at the time of the preliminary visits. The main assistance offered would be that of the time of the administrators and other staff in describing and explaining the operating systems of research costing and management at the universities visited and in providing documentary evidence to support the statements made.

GENERAL REPORT

Introduction

It is the purpose of this report to present views and opinions gained from a study of the relevant literature and from discussions, with administrators and researchers of various institutions, that have taken place as part of the feasibility study.

What has become apparent as the study progressed is the complexity of the problems facing university administrators and the confusion that exists as to the role of research management within universities. The discussions ranged from the philosophical through government involvement, administrative systems, financial control, academic behaviour, to the identification and measurement of research costs.

It seems essential, therefore, that the research plan is narrowed down to a limited part of the total problem, which can be identified and programmed to achieve a specific set of objectives determined by the resources available to the task.

As university faculty move further away from pure or basic research supported by government grant towards development or applied work for outside sponsors so the need arises for greater control of their activities, from an academic, organizational, financial and other points of view.

Funds may be obtained from a wide variety of sources, either by the individual academic, department or school, with non-government sources becoming even more important during times of economic stringency towards government funds for higher education. This calls for administrative and managerial skills to ensure that the commitments of the university are known in advance, accepted and monitored during the life of the research project and resources used correctly, efficiently and effectively in pursuance of the university's research policy. The implications of increased research activity arising from sponsored funds outside of the normal grant system do not seem to be always fully appreciated by faculty who do not recognize the need to alter the administrative structure and/or create systems to cope with this changing pattern.

Literature Reviews

From the voluminous literature on education and the growing contribution to higher education very little has so far appeared directed towards the administrative and financial aspects of research management. The main thrust has been to view the university as a total resource system to which can be applied the management methods and techniques of PPBS and MIS based on the increased use of computers. It is not clear to what extent the American models of university administration with their federal and state financial inputs can be used as a starting point for the analysis of British university research management but contributions from this source show greater awareness of the problems and a willingness to tackle them in advance of UK thinking and practice.

'University Management Accounting' (Fielden, 1969) is of general interest, as it is concerned with budgetary control and contains a chapter on research grants and contracts. It underlines the variability of the systems in a survey of 30 universities and recommends greater involvement of the Finance Office in research management. It points the way to the American experience by suggesting that:

> 'National research aimed at standardising and simplifying the requirements of the grant-giving bodies would seem to be required and might well produce some recommended standard form of contract into which all the varieties might be fitted'.

'Financial Management in North American Universities' (Davies, 1973) contains the report of a study tour of 12 American universities and 2 Canadian universities, by the Business Manager, University of Nottingham. In Section 4.1 - Sponsored Research, details of the American system of research management are given and contrasted with that of the UK. The rationalization of the procedures to recover indirect costs that has occurred in the USA would seem to overcome many of the problems facing the UK administrators with regard to the treatment of overheads allowed by different sponsoring bodies:

> 'It is in the area of indirect costs that one notices the major differences between American and British universities'.

This section of the report has eight conclusions which, in addition to recommending that the UGC and DES follow the American pattern of

negotiating agreed indirect cost rates, are similar to the points covered in the Bath research proposals. Section 4.2 deals with Consultancy and Section 4.3 with Patents.

The American system is well outlined in 'Sponsored Research and University Budgets: A Case Study in American University Government' (i.e. University of California) by Betz, F and Kruytbosch, C (Minerva, 1970). The first part of this article on their study describes the budgeting and research contracting procedures. It shows how:

> 'two general formulae have been applied to produce the revenue needed to recover overheads'.

(For federal agencies a fixed percentage of 15-20% is added to 'total direct costs').

> 'The other formulae estimates overheads as a percentage of the salaries and wages involved in research contracts: it is arrived at by a complicated procedure of calculation and negotiation'.

(e.g. In 1966-67 the overhead rate was calculated at 42%).

More information is contained in an article in College Management, (6 Oct 1971), by Gary R. Johnson, one time manager for sponsored research at the University of Michigan, entitled 'The Costs of Research - Both Direct and Indirect':

> 'The Bureau of the Budget Circular A-21 was written to outline the allowability of all costs of research, both direct and indirect, but the major impact was in the area of indirect cost computation in providing principles which could be used by all federal agencies in determining indirect cost rates'.

The general impression gained from the literature is that in America the Federal Government and its Agencies took the lead in tackling the problem of the overhead recovery rate to be included in research agreements, which resulted in the universities introducing the necessary administrative procedures and management accounting techniques to comply with the system. A similar situation has not yet arisen in this country although the position could change with a political initiative being taken by central government. Indeed, amongst the administrators spoken to, many would welcome a more formal system of overhead recovery with government departments and other sponsoring bodies agreeing to standard formulae for the calculation of indirect costs to be included in research grants and contracts.

Statistical Analyses Review

The UGC (Jack Walne) attempted by means of regression analyses of university expenditure to determine whether central overheads (i.e. all recurrent expenditure other than that of teaching and research departments) follow a consistent pattern over the university system as a whole. This led to a recommendation, in August, 1971, to universities to use an on-cost of 38-40 per cent of direct costs, as a useful starting point for general, and in particular small, research contracts where individual analysis of the indirect costs was inpractical.

In June 1973 the UGC requested details from the universities of the direct and indirect cost elements of research contract expenditure during 1971-72. Mr. J. Heywood who was on secondment to the CVCP, from the University of Manchester, was given access to this data, which indicated that the total figure of estimated costs i.e. overheads received for Government and other contracts as a percentage of direct costs averaged 10.5%, within the range 2.1% to 53.7%, for all the universities included in the analysis. There appeared to be no relationship between the overheads obtained (expressed as a percentage of direct costs) and the total research grants and contracts (expressed as a percentage of the total university income).

Michael Pickford, Sussex University, in his article 'A Statistical Analysis of University Administration Expenditure' (Journal of the Royal Statistical Society, A, 1974), challenges the usefulness of regression analysis as a basis for the allocation of funds between universities. Comparing actual administration expenditures of individual universities with the estimated values for administration expenditures based on his analysis, he found significant variations about the mean of between +31.8% and -46.1%. Even though the context is different, it does seem possible on this premise to question the suitability of using an average percentage for the calculation of overheads derived from the regression equation of the UGC analysis.

Pickford points out that there are considerable economies in administration expenditure up to 4000 students, and that size as well as type of university i.e. New, Technological, Larger and Small Civic, affects the administrative cost per student. His analysis of data for the period 1965 - 1970 led him to state that 'postgraduate students appear to be more than five times as expensive in terms of administration

expenditure as undergraduates' and 'that every pound of expenditure for external research funds results in an additional five pence worth of administration expenditure'. In this context the article by J.C. Walne, 'Analysis of University Costs at the UGC' (Higher Education, May 1973) is interesting because it showed that the higher costs of postgraduate training were associated with the small numbers of students each on a large number of taught courses and that the 'research postgraduate weighting' was in almost all subject groups substantially less than the traditional weights of x 3 (laboratory subjects) and x 2 (others) being as low as x 1 or less in the non-laboratory subjects. However, it appeared not only that some increase in expenditure was associated with postgraduates but also that expenditure against specific income, previously ignored as self-balancing, was associated with additional expenditure against general income. These articles are concerned with the problem of aggregate expenditure, under different heads, within the university system as a whole. As Walne points out 'valuable as detailed studies of individual universities, such as those at Lancaster and Bradford[1], may be, they are from a very small sample of the university system. The amount of work involved in making similarly detailed studies at all universities (and all on the same basis) would be formidable'. The regression equations used by the UGC in calculating the recurrent grant are not made public but they are based on student numbers and not on how each university decides to allocate this income between its different activities. It is, therefore, questionnable whether the application of regression analysis to the aggregate behaviour of costs in the university system is the appropriate method for measuring and controlling the indirect costs of research.

At the level of the individual university the question remains unresolved in general terms of whether research funds from outside sources contribute more to university resources than the expenditure they create. If as suggested by the UGC overhead costs increase proportionately to direct expenditure then universities should be obtaining a contribution of about 40% from all research contracts instead of the average of 10.5% indicated by Heywood. Even allowing for the probable improvement since 1971-72 in the greater attention

[1] See CERI studies in Bibliography.

that is being paid to this aspect of university financing it is unlikely that the percentage charged has changed radically. It would seem that what is required is realistic formulae for calculating the indirect cost element in research contracts that would have as the independent variables those resources legitimately expected to be used by the departments concerned e.g. accommodation, library, computer services, etc., rather than using a standard percentage which oversimplifies a complex situation and ignores the very real differences between institutions.

Statement of the Problem

This falls into four categories:

1. Academic
2. Organization
3. Administration
4. Management Accounting

1. *Academic*

The role of the faculty in research management is ambiguous. The immediate reaction of the academic to suggestions of a formalised system of management and control of research funds by the Administration is to view it as a threat to academic freedom and autonomy. This seems to be the case even when it can be demonstrated that some faculty will benefit from a change in the system towards central policy making and decision.

If change in research management can only be brought about internally through Senate and Council, then it is difficult to see how this will be achieved until, and unless, the faculty see the need for a radical re-appraisal of the systems operating within their own institutions. Individual self-interest and departmental autonomy will have to give way to an understanding of the total needs of the institution in developing research activity and the management of funds generated by it. The findings and recommendations of the main study might assist in this direction but for the purpose of the investigation the views and opinions of academics are likely to be unrewarding in determining the normative methods of research management.

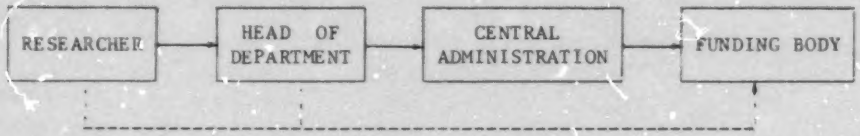
2. *Organization*

This can be illustrated by the following two models:

Research Proposals Flow

Old System:

Minimum or no control from centre

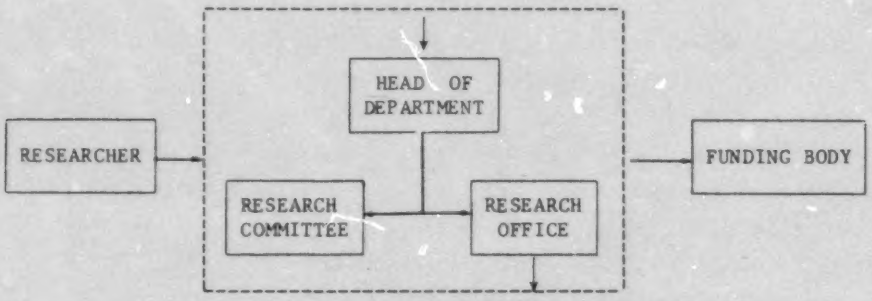


——→ Formal channel of communication

------→ Informal channel of communication, but can become formalized by by-passing central administration.

New System:

Integration of policy, planning, operation and control of resources between faculty and administration.



Research Committee — responsible for academic standards, research policy, planning and development, and overall allocation of resources for research.

Research Office — responsible for financial, legal, personnel and management aspects of research.

This represents a fundamental change in university government as it calls for an equal partnership between faculty and administration in research management which is not generally accepted, particularly in the older and civic universities. The CERI project 'A study on comparative effectiveness of alternative administrative structures' under the

direction of Professor P. Rivett of Sussex University, should be of interest in this context.[1]

However, the study of organization structure and relations would seem to require investigation and analysis of the complet university system and not just the part related to research management. For this reason an organizational approach to the problem would be unlikely to produce the sort of answers that would meet the aims of the Bath project and would tend to divert attention away from those issues that are susceptible to influence and change.

3. *Administration*

This appears to be the most likely and rewarding area for study since for any given organizational structure of university government there is an administration function of research management. This may be practised by the individual academic, department, school, central administration, or by any combination of them. The methods and procedures may be informal or formal, or a mixture of both. The degree of control exercised by the institution may be minimal or so constituted that research management plays an important part in the overall administration of resource allocation.

The task, therefore, is to investigate research management as a sub-system of the total system of university administration; to define its role in institutional management; and to examine the methods and procedures used. This requires a study of research management practice in different universities to ascertain the methods and procedures used in the submission of research proposals, and in the acceptance and control of research grants and contracts that arise from the successful applications for external funds. The objective is to produce a definitive handbook of good practice.

It also requires an analysis of the different methods and procedures adopted by the different sponsoring bodies, to assess to what extent improvement in the internal procedures of the universities might result from simplification and standardisation of the various applicable forms, agreements and contracts used by these outside institutions.

[1] See Article by Johnson & Palmer in Bibliography.

4. *Management Accounting*

This is closely related to the administrative system of research management, and thus forms an essential part of the study, while retaining a separate identity of its own.

There would seem to be the need for compromise in that the ideal form of management control may be unattainable under the present system of university government. In the American situation touched on above the university administrators have a clear advantage over their British counterparts since the changes that were brought about were Government inspired and required greater attention to be paid to departmental costs and to the identification and allocation of overheads. Also, the indirect costs recovered from funded research by the American institutions are retained centrally by the university and not distributed as income to the academic departments involved.

From the point of view of this study the need is to obtain input data in a matrix pattern as follows:

	PERCENTAGE INDIRECT COSTS ALLOWED BY DIFFERENT SPONSORS (e.g. M.O.D. Department of Health, etc.)			
PERCENTAGE INDIRECT COSTS OBTAINED BY DIFFERENT ACADEMIC DEPARTMENTS (e.g Social Sciences, Engineering etc.)				

The objective would be to make this information known to universities and, possibly encourage the UGC, DES and other bodies to work towards standard formulae for the calculation of indirect costs to be included in research grants and contracts.

To what extent a similar approach can be made to analyse costing data based on university budgets is unclear at this stage:

	PERCENTAGE INDIRECT COSTS RECOVERED BY SPECIFIC SERVICES (e.g. Library, Computer, Administration etc.			
PERCENTAGE INDIRECT COSTS CHARGED TO DIFFERENT ACADEMIC DEPARTMENTS (e.g. Social Sciences, Engineering, etc.)				

A comparison of the two sets of data would indicate inbalance between costs allocated to departments for university services and the recovery rate of departmental overheads against sponsored research activity.

What is required is the expertise of the management accountant to develop the definitions, identification and calculation of indirect costs and the formulae to be applied to their recovery, rather than the services of the statistician using regression analytical techniques.

RECOMMENDATIONS

Based on the full time services of one research fellow and one research assistant for a period of 18 months it is suggested that the research plan be developed around the specific areas of research management i.e. administrative methods and procedures, and management accounting i.e. costs of research with particular reference to the allocation and recovery of overheads. That is Items 2, 3 and 4 of the original proposals. It is also suggested that the part-time services of a management consultant and/or management accountant be obtained to provide the necessary technical expertise in defining costs and in determining cost centres, as an essential prerequisite to the development of overheads formulae.

A representative sample of up to 12 universities should be included in the first stage of the fieldwork, which would be concerned with carrying out a thorough survey of each institution's administrative practices and the collection of information. The objective would be to build up a comprehensive picture of the system in force as seen from the administrative departments and academic departments (particularly those with substantial research income). The survey method would be by personal interviews with staff and by collection of documentation and data illustrating the administrative procedures adopted towards research, and by consideration of the extent to which these procedures meet the perceived needs of the institution. Most of this work would be carried out by the Research Fellow and would be expected to last about 9 months.

At the same time information would be gathered by the Research Assistant from all the grant awarding institutions and other bodies concerned with negotiating research grants and contracts, to illustrate the differences in the types of forms used, details asked for, costing methods, overhead recovery rates, etc. The Research Assistant would also act as assistant to the Research Fellow in arranging and following up the visits made by the latter, maintaining files and records etc.

The second stage of the study would be concerned with obtaining information from the rest of the university population to compare with and extend the data collected during the first stage. It would also serve to test generalizations drawn from an analysis of the earlier

information and to see to what extent the systems in force differed from the models being developed. This survey would be conducted by postal questionnaire and could take place about half way through the research period.

This should allow the last six months of the study to be devoted to a final analysis and synthesis of all the data collected, the preparation of the handbook of good practice, and the development of formulae for the calculation and recovery of indirect costs.

Item 1 of the original proposals would most probably be incorporated in the recommendations arising from this study. It would be possible to develop it and Items 5 to 8 of the original proposals in subsequent research drawing on the findings of the more limited project now proposed.

APPENDIX 1

BIBLIOGRAPHY

This list is by no means comprehensive or exhaustive. It represents material referred to during the course of the study, some of it peripheral to the main theme but most of it relevant to an understanding of the background to the enquiry.

Those items marked:

(B) - Contain interesting bibliographies in their own right

* - not available at time of compilation and possibly difficult to obtain in some instances.

Government Publications

Council for Scientific Policy

Report of a Study on the Support of Scientific Research in the Universities (HMSO) Cmnd 4798, Oct. 1971.

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Dainton and Rothschild Reports (HMSO) Cmnd 4814, Nov. 1971.

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